PUBLIC MARINE STRUCTURES

Prepared for:

Economic Development Branch
BC Ministry of Sustainable Resource Management

With the Generous Support of:

Coast and Marine Planning Branch (MSRM)

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July 2002

BUILDING BLOCKS FOR ECONOMIC DEVELOPMENT & ANALYSIS

PREFACE

PURPOSE

Building Blocks have been conceived and developed by the Economic Development Branch of the Ministry of Sustainable Resource Management, under the guidance of Nancy South, Manager Economic Analysis, as an analytical tool that supports British Columbia coastal and land and resource use planning and decision-making and economic development initiatives. The Blocks contain concise business and sector information for a broad range of resource-based business types in BC. At this point, there are more than 30 Blocks either complete or in draft form. Several more Blocks have been identified as high priority by planning tables and other client groups. Additional Building Blocks will be developed over time, and some Blocks may be updated. For the most current Building Blocks, please see the Ministry of Sustainable Resource Management website, at: http://srmwww.gov.bc.ca/rmd/ecdev/

ACKNOWLEDGEMENTS

Generous support in terms of both funding and staff time has been provided by the Ministries of Energy and Mines; Water, Land and Air Protection; Agriculture, Food and Fish; and Forests, as well as by Skeena and Coast Regions of the Ministry of Sustainable Resource Management.

BENEFITS

Building Blocks are expected to provide the following general benefits:

- Increase efficiency and more informed decision-making by providing readily accessible, credible information to planning and economic development processes;
- Improve the consistency of economic information across planning areas;
- Support economic analysis and decision-making that occurs outside formal coastal and land use planning processes; and
- Provide linkages between economic analysis and other social and environmental analytical tools (through identifying resource requirements to support economic activities and general compatibilities with other sectors and values).

LIMITATIONS

Every effort has been made to ensure that the information contained in Building Blocks is accurate and consistent. Approved, credible data sources are the foundation for Building Blocks. All Blocks were reviewed by sponsoring agencies and other experts. However, users are cautioned that information is used at their own risk, and that the authors and sponsors are not liable for any damages. Any conclusions or interpretations by the authors are not intended to represent government policy. Also, note that Building Blocks do not provide site specific information nor do they consider requirements for sustainability (social, community, environmental).

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RECOMMENDED REFERENCE/CITATION

BC Ministry of Sustainable Resource Management, 2003, Building Blocks for Economic Development and Analysis, *[Title of Sector]*. http://srmwww.gov.bc.ca/rmd/ecdev/

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1.0 OVERVIEW

Public maritime structures in the context of this report are considered to be marine installations for use by the general public and may be for commercial, recreational or scientific purposes.

Maritime structures within port authority jurisdictions or BC Ferries' installations are also in the public domain. Policies and priorities of these agencies, however, are considered beyond the scope of this assignment unless maritime structures within their jurisdiction are useable by the general public for other than the authority's purposes.

1.1 Businesses That May Use Resource

The lands, islands and waterways of British Columbia's coast are an important resource to the Province. The existing infrastructure of small to medium public maritime facilities allows easy access to these coastal waters by the general public. This provides many opportunities for related businesses or activities:

- **Backcountry and wilderness tourism** recreationists and visitors are now seeking more water-based tours such as kayaking and whale watching, cultural tours exploring the heritage of the coastal First Nations, or historical industrial sites (e.g. abandoned canneries at Port Edwards and on the North Coast). Marine facilities can serve as staging areas and focal points for this type of tourism.
- Many **recreation** sports such as sailing, kayaking, boating and diving, depend on an infrastructure of marine facilities for water access.
- **Fishing** – commercial, sport and by First Nations – requires a base for the fleets. This is provided by marinas, related dock facilities and protected harbours.
- **Cruise Ships** – "pocket cruise" vessels that can berth at smaller dock facilities and in more shallow water will require marine infrastructure and provide opportunity for associated business development in and around marine facilities.
- **Privately owned ferries**, water taxis, barges, tugs, and the like, provide for movement of goods and vehicles.
- **Public access**[1] to the waterfront by the development or refurbishing of fishing piers, boardwalks, enhances community liveability and attracts visitors and business to the waterfront.
- **Marine Protection Areas**[2] are representative areas of coast, significant beaches, boat havens with important anchorage, cultural and heritage features, critical fish spawning grounds, bird sanctuaries, whale feeding grounds, which have been designated as protected areas. The continued development of such areas will require marine access for policing, increased tourism and scientific research.
- **Associated businesses** include marinas, repair shops, servicing facilities, fuelling stations, boat rentals, marine supply stores, tour companies.

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2.0 RESOURCE ISSUES AND SENSITIVITIES

Public marine infrastructure provides access to and safe usage of a marine physical environment, including coastal lands, islands and coastal waterways with significant viewscapes, and foreshore access.

Requirements during construction or operation include:

- mitigation measures during construction to protect foreshore and coastal waters in order to preserve fish stocks and habitat;
- availability of upland areas for docks, marinas etc. for development of buildings, waste treatment facilities,
- underground services and storage tanks, car parking, maintenance areas and utilities;
- shoreline and waterways that allow unimpeded access by vessels to and from the structure; and,
- in many cases, road access and linkage with main road.

Potential sensitivities and conflicts:

- environmental impacts during construction – e.g., effects on eelgrass, habitat;
- First Nations' land and rights – new structures and road access may conflict with traditional or food gathering uses by First Nations, or their coastal heritage sites;
- conflict between use of the marine structure and environmental values – e.g., waste disposal by boats that use docks;
- industrial versus tourism use; and,
- risk associated with future off-shore oil and gas exploration.

3.0 INVESTMENT REQUIREMENTS

3.1 Scale of Operations

Generally investment requirements need to be assessed on a case-by-case basis and will depend on the nature of and reasons for the particular project. Maritime structures can range in size from small public fishing piers (10 to 15 metres in length) with or without access trestles (usually about 3m wide) which have no actual berthing facility, to major docking facilities like Canada Place, with continuous berth space for 300m long cruise ships. Such wharves may be 700 m long, for instance, allowing berthing of two cruise ships.

> *A recent development for the Port of Bridgetown in Barbados included a 200 x 10m trestle and a 130 x 40m deck with mooring dolphins seaward of the deck. This facility could handle two of the new generation cruise ships, each over 300m long, one on each side of the pier.*

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Other public maritime structures may include simple moored floats (10 x 2 m) and a boat launch ramp for small boats, to large fishing harbours accommodating 300 to 400 boats at continuous serviced floats secured with steel or timber pile systems.

Steveston fishing harbour contains five floats between 90 and 140m long, moored with timber piles and connected by 35m long aluminium ramps to a 150 x 6m pier. The harbour might accommodate up to 200 fishing boats, depending on their size.

3.2 Capital Costs

The following costs are presented as a guide only, and are drawn from a body of extensive work in the construction and operation of public marine structures.

- Start up/capital costs will vary substantially depending on the type of facility. These could be, for example, fishing piers, marinas, marine parks, small cruise ship or ferry berths, boat launch ramps, harbours or simply dolphin structures for berthing or navigational purposes.
- Costs will also be determined by the size and sophistication of the facility. Other factors which can significantly affect cost are site location, water depth, site exposure, site preparation, geotechnical conditions, utility requirements, labour and material costs and market conditions. (More detail on these factors is provided in **Appendix A**.)

  In 1993, BC Ferries rebuilt berth No.5 to handle double-decker ferries at Tsawwassen Terminal for a capital cost for marine work of $15 million.

  The ferry dock at Sidney on Vancouver Island was recently strengthened (2001) to handle tourist bus traffic for an estimated capital cost of $300,000.

  A 160-berth marina on Vancouver Island cost over $3 million to construct. This included a 215m long rubble mound breakwater, which added substantially to the cost. The work included concrete floats and steel pipe anchorage piles, dredging, and relocated fuel and customs docks.

- Order of magnitude costs for construction of typical infrastructure are as follows:[3]
  - cruise ship piers – $3,000 to $4,000 / m^2;
  - fishing pier, access trestle construction – $500 to $1,500 /$m^2$;
  - ferry ramps – $2,000 to $3,000 /$m^2$;
  - floating docks (small craft) –$250 to $600 /$m^2$ depending on type of float systems – concrete, timber etc. (excluding mooring systems, site preparation and utilities); and
  - marina – $10,000 to $20,000 / boat moorage slip (excluding inshore utilities and back-up areas, buildings). Varies from medium to high-quality installation.

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3.3 **Ongoing Costs** (include repairs, maintenance, operations)

- Pier, access trestle repair/upgrade – $200 to $750 /$m^2$, depending on amount and nature of repairs. At repair cost levels above 50% of replacement cost, it is usually more economical to demolish and rebuild.
- Maintenance costs are affected by the expected life of the structure. Timber structures, with shorter expected lifespan (around 25 to 30 years) may have higher maintenance costs than a concrete or steel structure with life expectancy closer to 50 years.
- Information on operational costs unavailable.

4.0 INFRASTRUCTURE

A significant amount of public marine infrastructure is in place on the BC coast and rivers. Many federal government dock systems have been or are being sold off to local municipalities, regional districts and other organisations where possible.

Typical public marine infrastructure includes the following:

- fixed and floating docks (piers, floats, jetties, bulkheads);
- access trestles, ramps and gangways (including vehicular ferry ramps);
- marinas, defined as protected berthing facilities for pleasure vessels (sailboats, power boats,) and which may provide facilities for other water based services. (Kayaking, diving, fishing, water ski-ing etc);
- boat launching ramps;
- waterways – navigable channels, turning basins, shipping lanes;
- environmental protection systems (breakwaters, beach and foreshore protection);
- berthing and mooring systems (dolphins, buoys, mooring bollards, fenders);
- navigation and communication systems (lights, markers, buoys, radio beacons);
- marine maintenance (dry docks, slipways, boat maintenance areas, boat lifts, cradles, keel blocks, mast handling equipment);
- uplands development (sheds, buildings, parking areas, roads); and
- utilities (power, water, fuel, waste disposal, tank storage).

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5.0 MARKET

5.1 Services Provided

There is no market for public marine structures in and of themselves – instead they support a range of commercial, industrial, recreational activities, and some water-based social activities. These are:

- shipment of goods and people intraprovincially and internationally;
- staging area for water-based recreational or sports activities – e.g., kayaking, cruises, pocket cruises, private boats, etc.;
- provides community and tourism focal point – e.g., new pier at Trail Bay in Sechelt; and
- provide community access to the water.

5.2 Market Demand

The key markets that rely on public marine infrastructure are as follows:

- **commercial fishing** is still important industry, but has declined on the BC Coast due to depletion of the fish stock;
- **sportsfishing** also continues to be active, has also been curtailed because of the fish stock;
- **small scale industrial traffic** such as tugboats;
- **outdoor tourism and ecotourism** sector has stimulated demand for kayaking and canoeing tours, pocket cruises, and other water tours that require marine infrastructure – piers and waterfront structures can also be the staging area for events and festivals, or unique experiences – e.g., Richmond Tall Ship festival, August 2002;
- the Alaska **cruise industry** – while it injects little into BC coastal communities outside Vancouver, it has drawn international attention to the Mid and North Coasts;
- population growth in many coastal communities has increased **provincial commercial shipping**;
- **coast guard and DFO** operations;
- **geological and scientific expeditions** to coastal destinations require water access; and,
- marine access provides an **important link for remote coastal communities** with the rest of the province.

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6.0 LABOUR MARKET

- The *operation* of public marine infrastructure generates little employment or earnings directly, but the operation/existence of the infrastructure can stimulate or support local economic activity, thereby generating indirect employment – e.g., fishing, tourism, local/provincial trade and transportation. Employment in tourism and the service sector occupations is low paid minimum wage work, while some seasonal employment like fishing has higher wages.
- Employment in a variety of trades is generated during the construction of a new public maritime structure. This employment is generally a short-term and seasonal, usually lasting from 1 to 12 months. It often employs local workers or, where specialized skills are not locally available, workers from elsewhere in the province. Typical trades would include:
  - marine construction (bridgemen)
  - carpenters
  - labourers
  - steelworkers
  - electrical and mechanical trades
- The workforce is generally unionized, particularly on larger projects.
- Contractors in the construction sector generally charge out at about $50.00 per hour.
- Average hourly wage rate for construction workers is approximately $25, net of benefits.

7.0 CAPACITY

7.1 Opportunities for Expansion

- upgrading or adding new structures to support new water-based tourism ventures – e.g., pocket cruise pier in Prince Rupert;
- upgrading or adding new structures to support specific new industrial ventures;
- addition of mooring systems (e.g., dolphins, buoys) to support smaller-scale, motorized and non-motorized boat access to less accessible parts of the coast, for uses such as kayak or boat cruises, sportsfishing, hut-to-hut systems;
- Canada-US marine park corridor along the "Inside Passage" – MOU drawn up in early 1990s by Canada and US governments to jointly develop a recreational marine corridor for motorized and non-motorized vessels. To the best of our knowledge, this initiative still has support in Alaska, but was not pursued after 1994[4];
- supporting infrastructure for off-shore oil and gas exploration and development, if this sector is developed; and
- reconstruction/preservation of original public maritime structures or historical features, and improved water-community connectivity, will foster tourism development.

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8.0 REGULATORY REGIME

8.1 Process of Securing Approvals

- The construction and operation of marine structures must comply with a host of federal, provincial, regional district and/or municipal regulations. A proponent planning to construct a new maritime structure such as a community pier or port will initially contact the relevant provincial or federal government agency to undertake the application process. The first point of contact is generally Land and Water BC, which administers the *Provincial Land Act,* and has jurisdiction over all Crown land. This agency, in turn, can refer the proponent to other provincial and federal agencies that also have regulations governing use of the project site.
- Construction projects in navigable waters require approval from the Navigable Waters Protection Officer of the Canadian Coast Guard, which administers the Federal *Navigable Waters Protection Act* (FNWPA). Applications to the Coast Guard generally also trigger the federal Department of Fisheries and Oceans (DFO) and/or the provincial Ministry of Agriculture, Fish and Food (MAFF) approval processes. Projects subject to the *Navigable Waters Protection Act* are automatically subjected to an environmental screening process under the *Canadian Environmental Assessment Act* (CEAA).[5] Assessments range from a screening document for routine proposals, to a comprehensive study and panel review for large scale projects with significant environmental impacts.
- For most projects, the CEAA process is administered by the agency with jurisdiction over the legislation affected by the CEAA trigger.

8.2 Triggering an Environmental Review

- If the project is deemed to be small, or below a certain "threshold", and in compliance with all regulatory requirements, Land and Water BC will issue a License of Occupation, and the Coast Guard will also issue a permit for the project to proceed.[6]
- Projects over a certain size, or with significant potential impacts, may "trigger" a **provincial environmental review process**. The environmental agency coordinates the full process, often including a public consultation program.
- Depending on the nature and location of the project, the proponent will also be required to meet certain **municipal** or **regional district** approval processes, such as zoning bylaws, or compliance with Official Community Plans. The proponent is generally responsible for assuring compliance with these governments, separately from the provincial approval process.
- If the proponent is required to deal with a **Port Authority** – e.g., Port of Vancouver – this may translate into additional regulations over and above those of the provincial and federal governments.

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8.3 Duration of Process

- Land and Water BC has a policy of managing regular applications (that do not require environmental review process) in 140 days or less.

If an environmental review is triggered, the entire process can last from a few months to a few years, depending on the information required, the deemed effects, and amount of consultation required. The process of submitting an application can take a long time, and generate considerable costs, depending on the amount and type of information required. For example, a recent environmental application for a gravel port in Bella Coola has cost the proponent over $1 million.[7] However, once the application has been made, the Environmental Assessment Office generally endeavours to make a decision within 6 months.

Specific regulations governing construction and operation of public marine structures are outlined in **Appendix B**.

9.0 GOVERNMENT REVENUES

There is a complex system of Port Authority, federal, provincial and other fees and taxes in effect in British Columbia's harbour and shipping industry. The fees and taxes vary by harbour and Port Authority, and by factors such as ownership of the terminals. For example, The Fraser River Port Authority levels harbour dues, but berthage and wharfage are charged by Fraser Surrey Docks, which owns the terminals.

Generally speaking, the primary sources of government revenue arising from public maritime structures include some or all of the following (this list is not, however, exhaustive):

- payable to Port Authority (if the structure is under the jurisdiction of a Port Authority): harbour dues, wharfage and berthage;
- payable to federal government: stipend from Port Authorities (if applicable), harbour dues, berthage, wharfage, commercial boat registration, tax on business profits, income tax from employees, GST,
- payable to provincial government: property tax, corporate tax on profits, income tax from employees, PST on business inputs; and,
- payable to municipal government: property taxes, payment in lieu of taxes by Port Authorities.

These are described in more detail in **Appendix C.**

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10.0 COEFFICIENT DEVELOPMENT

10.1 Choice of Methodology

Labour estimates associated with the *construction* of a public marine structure can be derived in a number of ways:

1. calculate Person Years (PY's) using specific engineering data on trades, project duration and number of manhours of project;

2. estimate the labour share of total construction costs (can vary with the project, and be as high as 75 to 80 percent), and divide this by the average project wage (net of benefits) to calculate total PY's of employment; or

3. estimate order-of-magnitude construction employment using industry multipliers derived from the BC I/O Model.[8]

More specific information would be required about the type of operation to determine if employment or earnings are generated.

10.2 Construction Industry Employment Multipliers

In the absence of specific information about the configuration and type of marine structure being considered, the third, most general approach may be most appropriate if comparing employment impacts related to various levels of capital investment. The appropriate multipliers for "other engineering construction" are:

- direct jobs: 8.31 PY's per $1M of spending
- indirect jobs: 5.51 PY's per $1M of spending[9]

10.3 Wages and Salaries

Wages & salaries will be contingent on collective agreements and level of non-union employment. Total construction employment PY's can be multiplied by average wage per year to estimate total earnings per year. Average hourly wage is estimated at $25 per hour (net of benefits), although this varies by trade.

10.4 Issues Regarding Coefficients

- The methods of calculating employment impacts discussed above produce estimates of *direct* employment only.
- The choice of methodology will be governed by the level of detail of available information. At the pre-feasibility level, approach (2) or (3) above are the most suitable. At the feasibility level, when information on employment & earnings by trade, and duration of each construction phase is available, approach (1) can be employed, and will produce the most accurate estimates.

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APPENDIX A: FACTORS AFFECTING CAPITAL COST

- **Site location** may be variable or fixed depending on the use of the facility. For instance an existing community may wish to construct a fishing pier, which would thus fix the location within the available shoreline most easily accessed by the public. On the other hand a marina developer may have options for location depending on the most advantageous water depths, protection etc. combined with reasonable land access. Cost levels may be optimized more readily if there are several options for location.
- **Water depth** is a prime consideration when locating a marine facility. The range of marine vessels and their associated drafts (depth of vessel below its waterline) dictate the minimum water depths needed for the facility. If dredging or rock blasting is necessary to achieve the design depth, costs will rise dramatically. Where there is very deep water, it will affect the type of structure that can be constructed and could mean significant costs for suitable marine structures – e.g. longer piles or increased amounts of rock filling and slope protection.
- **Site exposure to weather, wave and tidal action** may require the construction of a breakwater to shelter the marine facility. This can be a significant expense if there are no alternative naturally sheltered sites.
- **Site preparation** such as dredging, underwater blasting, clearance of back-up areas will all influence final costs.
- **Geotechnical conditions**, i.e the type of seabed and soils underneath, will be a major criteria in site choice and costs. A small river may have created deep layers of gravel at its mouth making installation of marine piles relatively easy, while deep loose sand deposits (as found along the Fraser River) may necessitate very long pile systems. Sloped rock surfaces may need socketed pile systems or large amounts of retained fill to create a berth face.
- **Utility requirements** (electricity, sewage) will vary depending on the type of facility and the remoteness of the site.
- **Labour and material costs** will vary depending on current market forces, union/ non-union workforce, accommodation for workforce, shipping requirements to site for materials, amounts and quality of materials among many other economic factors.
- **Market conditions** will have a direct bearing on costs, influencing such factors as availability of labour and materials, cost of capital among others.

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APPENDIX B: REGULATORY REGIME

Key provincial and federal government agencies and corresponding regulations that must be satisfied either during a regular approval process, or a full environmental review, include the following.

Regulatory Agency / Act	Regulatory Requirements and Approval Processes
Provincial	
Land and Water BC – administer the *Provincial Land Act*	➤ Regulates sale, lease, and license of occupation, right-of-way, water lot licenses, special use permits, easements, map reserves and construction on provincial crown lands. Prior to granting occupancy permission, typically requires that approval for proposed works be obtained from other regulatory agencies with jurisdiction over the proposed location of the work.
Provincial Water Act	➤ Water Management dept. of WLAP reviews any activities that may affect volume of water flowing in a watercourse or the morphology of the channel of the watercourse. Typically applies to project drainage systems and effluent discharge or work in a stream.
Ministry of Agriculture, Fish and Food	➤ Provides water-licensing tools to protect fish and fish habitat e.g. riparian rights, management plans for restoration of fish population. Ministry is yet to establish application of Act for development referrals. ➤ Licensing and regulatory control of commercial fishing, fish processing, buying and selling of catches, marine plant and shellfish harvesting and aquaculture. Project review for impact on commercial fisheries etc.
Provincial Wildlife Act	➤ WLAP administers this act for protection of wildlife and conducts reviews of project accordingly.
Federal	
Dept. of Fisheries and Oceans / Ministry of Water, Lands and Air Protection (WLAP) – *Federal Fisheries Act*	➤ Regulates fisheries through the Federal *Fisheries Act* to protect fish and fish habitat. Enforced through the Fish and Wildlife Habitat Protection Program of WLAP. Often, works in and about fish habitat require the approval of WLAP and DFO.
Canadian Coast Guard – *Federal Navigable Waters Protection Act (NWPA)*	➤ Administers the Federal *Navigable Waters Protection Act* (NWPA) that regulates any activity in navigable waters in Canada. Approval under NWPA must be obtained for projects within navigable water. Intent is to ensure all marine and coastal charting is current.
Federal Canadian *Environmental Assessment Act*	➤ Ensures consideration of environmental effects of federal projects. Triggered through the direct or regulatory involvement of a federal agency in a project. Lead by agency with jurisdiction over legislation affecting the project.
Federal Migratory Birds Convention Act	➤ Protection of migratory birds and habitat. Administered by Canadian Wildlife Service of Federal Dept. of Environment.

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APPENDIX C: GOVERNMENT REVENUE SOURCES FOR PUBLIC MARINE STRUCTURES

The following schedule summarizes the principal sources of revenue to Port Authorities and to municipal, provincial and federal governments that arise from the operation of public maritime structures. Depending on the economic activity and what is being shipped, some or all of these may apply.

Income Type	Description
Port Authority	
Harbour dues	➤ based on value of gross registered tonnage; varies by Port Authority – e.g. rate in Prince Rupert is .0743% of gross registered tonnage for commercial vessels
Wharfage	➤ fee for handling cargo at the terminal. Based on weight or measurement of the cargo and is variable by commodity. For example, Port of Vancouver charges $2.15 per tonne of wood pulp, or $2.43 per thousand board feet of lumber ➤ for containers, fees based on size of container and direction of the container movement. ➤ fee schedules are available on Port Authority websites: e.g., www.vancouverport.com, www.rupertport.com.
Berthage	➤ Fee relating to physical size of a vessel alongside Port Authority berths – e.g., Port of Vancouver charges per metre, with rates varying by coastal, passenger or other vessels
Throughput	➤ in cases where the Port Authority has a contract with the suppliers, a special throughput rate will be negotiated that replaces wharfage and berthage fees – these are confidential ➤ throughput varies by Port Authority: throughput of "tariffed" ports is calculated according to port cost structure and requires federal govt. approval
Municipal	
Property taxes	➤ mill rate on commercial and industrial land based on mill rate on $1,000 of assessed value ➤ varies by municipality and kind of economic activity – e.g., Nanaimo charges 53.215 cents per 000$ of assessed value for major industrial land use, or 5.32% of assessed value
Payments in lieu of taxes	➤ payments in lieu of taxes make by Port Authorities – calculated on a graduated scale. Some Port Authorities and municipalities are still negotiating the formula – e.g., Fraser River Port Authority

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Income Type	Description
Provincial	
School Property Tax	➤ rate varies by class and value of property ➤ major industrial and other rates are available from tax policy branch of BC Ministry of Finance ➤ revenues go into provincial govt. general revenue
P.S.T.	➤ vessels over 500 tonnes are exempt
Employee Income Taxes	➤ Based on the average earnings level in BC for transportation employment ($45,0001) a total of 8.3% is collected in provincial personal income taxes.
Corporate Income Taxes	➤ 13.5% of taxable corporate income.

[1] Source: Industry Canada, average wages & salaries for transportation equipment industries. Tax rates from Revenue Canada, July 2002.

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APPENDIX D: INFORMATION SOURCES AND FOOTNOTES

BC Ministry of Finance, Tax Policy Division

British Columbia Statistics

City of Nanaimo, Tax Department

Clover Point Cartographics(March 2000). *Forest and Fisheries Tourism Opportunities Study for the North Coast Forest District.*

Fraser River Port Authority

Griffin, Derek. BC Environmental Assessment Office.

Leppanen, Pentti, Lands and Water BC.

Industry Canada strategis website

Marlyn Chisholm & Associates (April 2001). *Tourism Opportunity Strategy for the Mid Coast Forest District of BC.*

Prince Rupert Port Authority

Richmond Tall Ships * - planning, design and construction of floats, pier upgrades and shore mooring systems for Tall Ships Festival in Aug 2002

Sask Trends Monitor

Saskatchewan Bureau of Statistics

Sechelt Public Wharf * - planning, design and construction, 2000

Sidney Ferry Terminal Upgrade*, inspection, design and construction for Public Works and Gov. Services, Canada 2001/2002 and Washington State Ferries

Transport Canada, Harbours and Ports Division

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[1] City of Vancouver Policy Report (Nov 1998). *Blueways Policies and Guidelines.*

[2] Governments of Canada and British Columbia (1998). *A Strategy for Canada's Pacific Coast* - discussion paper.

[3] Source of cost data: information from several marine projects undertaken in British Columbia. A range of costs are provided for reasons identified in **Appendix A.**

[4] Source: US Forest Service - Alaska Region; copy of draft MOU provided to author in 2000.

[5] Report to Seabulk Consultants by Envirowest Consultants Ltd., 1999.

[6] Likely with certain requirements regarding construction or operation of the structure.

[7] Source: Pentti Leppanen, Land and Water BC, July 2002.

[8] Horne, G. and Powell, C. *Provincial Economic Multipliers and How to Use Them, BC Ministry of Finance*, 2001. (It is not known at the time of writing whether updates to this publication will continue in the future.)

[9] Ibid. based on 2000$; large aggregation; 75% recycle rate.

* Recently completed project on coast of BC.

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